Review on Front-End Planning in Construction Project

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Abstract- *Construction projects are seen as the biggest drivers of both the global and national economies and as the biggest contributors to the construction sector. The need for pre-project planning has been recognized based on past experience with some unsuccessful projects. Effective construction project management is involved in the early stages of the project. These problems arise from a lack of adequate infrastructure, such as the transportation, power, and telecommunications systems, environmental risks, increased project costs and time overruns before the project even starts, convoluted bureaucratic contract procedures, and political instability. Front-end planning is a useful methodology that supports multiple the unpredictability and uncertainty found in the construction process. Detailed information about the front-end planning process is contained in this paper.*

Keywords- construction projects, construction industry, construction project management, front-end planning.

I. INTRODUCTION

Front-end planning is the process of gathering information that will allow owners and investors to address risk and choose how to deploy resources to increase the likelihood that a project will succeed. FEP, or front-end planning, is a preplanning stage that identifies projects with a good chance of meeting their time, cost, and performance goals. FEP aimed to give project stakeholders—particularly clients—a deeper understanding of the project's scope definition so they could make informed decisions about the project's justification. The entire FEP stage includes several related activities, such as the following: determining the mission need or business objective; determining the scope that satisfies such mission or objective; providing a foundation for project design; providing project estimates (time and cost); evaluating financial and staffing resources; and identifying risk factors that the project must address. , the project's organizational structure, and a rough execution schedule. However, the need for thorough preplanning makes it necessary for all of these tasks to have clear definitions, making FEP the most crucial phase that requires extra attention from all project stakeholders.According to this point of view, FEP is a crucial tool for the project management team to perform project estimates (scope, schedule, and cost) as a foundation for a more in-depth design. In other words, a correctly specified FEP acts as a proactive tool for assuring project stakeholders of the scope's completion in a manner that is more predictable and acceptable to them. From a different angle, solid preplanning (also known as front-end planning) can serve as a solid foundation for managing project execution.

Front-end planning offers improved insight for more intelligent building project execution. It synchronies the technical and business objectives to open the door for thoughtful project planning. It gives owners or investors' confidence that their capital resources are being used efficiently and effectively thanks to the generated knowledge. The outcome is defined as project success when costs are reduced, productivity is increased, and profitability is maximized. The significance of planning ahead: Front end planning is the "process of obtaining sufficient strategic information with which owners may handle risk and decide to commit resources to maximize the likelihood for a successful project," according to its definition (CII 1994). The CII phase gated front end planning process is depicted in Figure 1. Just before the project's design and construction, or phase gate 3 on the model, front end planning typically takes place. Perhaps the most crucial step in the life cycle of a capital facility project is front end planning. It is concentrated on forging an early and strong connection between the project's scope, cost, and schedule, as well as the business or mission need.

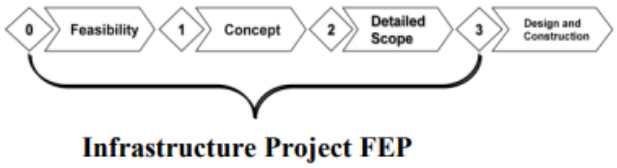

Figure1. Front-end planning process.

According to CII research, well executed FEP has contributed to total design and construction cost reductions of up to 20%, schedule reductions of up to 39%, improvements in cost and schedule predictability, and a higher likelihood of

achieving the project's environmental and social goals (CII 1994).

II. INITIAL PLANNING PROCEDURE

A project moves through several phases of front-ed planning as it develops from conception to completion. Prior to beginning any work on purchasing, building, commissioning, and turning over the finished construction product, these phases are outlined. Phases of the front end planning process include:

1. Organization
2. Data Generation
3. Evaluation of alternatives
4. Project Definition
5. Decision

2.1 Organization:

Who is in control of the organization?

Who has the power to decide how to spend money and make adjustments? What is the reporting structure for the project? How does the group work well together? The front-end planning organization step makes this evident. The formation of a project team is the first action in the organization phase.

Some members of the project team are only briefly participating, contributing their expertise or providing specialized materials during a certain phase, while others, like the owner, investors, project manager, or lead consultants, are actively involved throughout the entire project. In order to put in the greatest efforts for the project's success, it is assured that team members are properly chosen. Below is a diagram of the organizational structure of a building pro
ject:

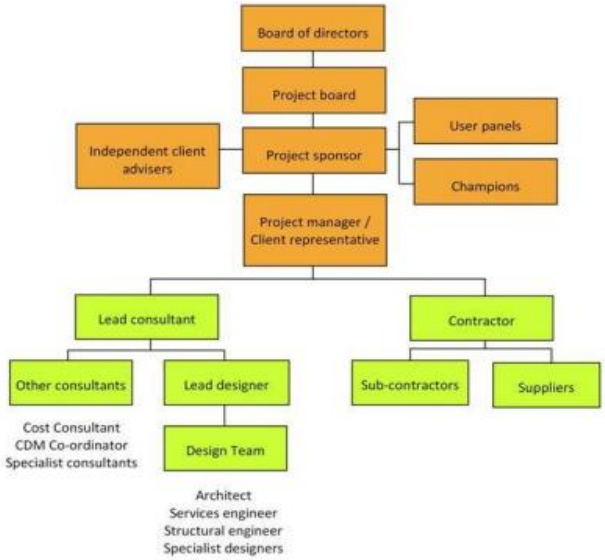

Figure: 2 Organization chart for a construction project

The project charter for the planning stage must be written as the next step. Project scope, deliverables, objectives, stakeholders, milestone schedule, risks, and business and organizational information are all included in the project charter's many sections. Establishing a clear definition of the roles, responsibilities, and reporting structures is the last step in the organization phase. To assign roles and responsibilities to people and determine whether the organization needs to make new hires, a role and responsibilities matrix can be created.

2.2. Data generation

Construction contractor conducts analysis for deployment of relevant technology, which is then reviewed by design professional. The project name, engineer in charge, project type, start and end dates, geological information, and historical information are all included into the project site information form. In terms of project planning, design, and layout, site topography is crucial. The project manager assesses the project site data. The following phase is to create the conceptual scopes, budgets, and timetables that are essential to any project. For the purpose of collecting data, many tools and professional services may be purchased.

2.3. Evaluation of alternatives

Identifying the alternatives is the first step in the examination of alternative projects. The options are restricted to those that are potentially possible, would achieve the majority of the project's fundamental goals, and would prevent or significantly mitigate any severe negative effects of the project. The definition of the reasonable range of options that will encourage well-informed decision-making is the second

phase. In the final step, it is necessary to provide enough details about each alternative to enable for accurate evaluation, analysis, and comparison with the project. To summarize the comparison, matrices can be used to show the key traits of each alternative and their noteworthy effects. If a different course of action might have one or more serious negative effects Additional impacts that would result from the project are suggested.

Technology, site/location, conceptual scopes and estimations, and appraisal based on high-level financial concerns all have an impact on alternatives.

Two categories of choices are possible for review:

(1) Project alternatives that are whole different projects or other strategies for attaining the project's goals as opposed to the project or a modified project
(2) Project alternatives that incorporate altered project elements, such as altered project procedures and/or altered facilities.

2.4. Project Definition

The process of identifying a project's purpose and coming up with alternate ways to achieve it is known as project definition. The project definition process entails three steps: deciding on the project's objectives, converting those objectives into standards for evaluating potential designs or solutions, and coming up with alternative design concepts.

The following components are included in the project definition package:

1. Consider project risks.
2. Describe the project's scope and objectives
3. Specify the project execution strategy
4. Create project control policies
5. Create a package for the project definition

After being created, the project definition package is converted into a business case and then submitted to the appropriate authority for approval. The decision to move forward with the project is subsequently made by the approving authority.

2.5. Decision

Making a sensible choice is the entire point of engaging in decision-making. Making rational decisions involves having a propensity that is appropriate for the objectives already set forth within the restrictions and circumstances that are present. The models that the authorities utilise form the basis of decision-making. Some of the decision-making models are as follows:

1) SWOT Analysis
2) Maslow's Pyramid
3) Pareto principle
4) Monte Carlo simulation
5) Decision tree analysis

Following the final decision, the project execution and monitoring activities begin.

III. PROJECT DEFINITION RATING INDEX (PDRI)

The PDRI is a tool used to gauge how well a project's scope has been defined. Before detailed design and construction, project representatives will use this tool to evaluate the aspects of the scope definition based on its level of completeness. After each component has been evaluated, an index that indicates the project's relative level of definition is calculated. A score that's lower means the scope definition is more thorough (CII 2008a; CII 2008b).

To properly weight the various components of the PDRI process, peer group assessments and workshops with professionals in the infrastructure business were part of the creation of the infrastructure PDRI. This development effort's core premise is that there are FEP process steps and data that that will enhance a capital project, in this case an infrastructure-related project, can be defined. A project team (and an organization) must properly carry out this procedure in order to have a more successful project endeavor because it and its associated variables will positively influence project success.

A front-end planning tool called the Project Definition Rating Index was created by the Construction Industry Institute in 1994. The degree of scope definition of a project is measured by the PDRI tool. It consists of a collection of scope definition components that must be assessed. Before building begins, the project team evaluates the level of completion. After evaluating each component, an index is generated that indicates the relative degree of project specification. an entire definition receives a lower rating. Both construction and industrial projects can use PDRI. The early prediction of project success is provided by PDRI.

Testing against actual project results serves as validation. PDRI has been shown to be successful for both

little and big building projects. PDRI consists of 70 elements, which are divided into the following 3 categories:

1) Basis of decision/scope (50%)
2) Front-end definition/preliminary design (42%)
3) Execution approach (8%)

SECTION I - BASIS OF PROJECT DECISION							
CATEGORY / Element	Definition Level 0	1	2	3	4	5	Score
A. PROJECT STRATEGY							
A.1 Need & Purpose Documentation							
A.2 Investment Studies & Alternatives Assessments							
A.3 Key Team Member Coordination							
A.4 Public Involvement							
CATEGORY A TOTAL							

Definition Levels

0 = Not Applicable
1 = Complete Definition
2 = Minor Deficiencies
3 = Some Deficiencies
4 = Major Deficiencies
5 = Incomplete or Poor Definition

Figure3. Extract from PDRI Project score sheet

IV. BENEFITS OF FRONT-END PLANNING

The following are the results of front-end planning being used in various construction projects around the world:

1) Decrease in Contractual Conflicts: By establishing defined objectives and definition, front-end planning has reduced the issue of contractual disputes.
2) Fewer design changes: Front-end planning guarantees that there are defined processes in place for managing and regulating changes to any aspect of a project, ensuring that any necessary modifications will have the least possible negative effects on the project.
3) Appropriate material supply: Front-end planning defines contingency measures to address material shortages.
4) Appropriate contractor selection: A reputable contractor is chosen through a competitive bidding process, which eliminates issues with unqualified contractors. Front-end planning is concerned with choosing an appropriate tendering procedure.
5) Ease of financial management: Insufficient money may cause a project to be delayed or abandoned. Front-end planning is implemented in a project to address this issue.
6) Adequate labour supply: Front-end planning includes effective training, recruitment, and transportation initiatives that address the issue of labour availability.
7) Lessening of weather-related issues: Front-end planning's contingency plans take severe weather into account.
8) Increased operational effectiveness and decreased risk of project failure.
9) Better business objective achievement and fewer scope modifications.
10) Better risk management and increased cost and schedule predictability.

V. CONCLUSION

This study aimed to investigate the importance, and impact of FEP on CONSTRUCTION PROJECT and to encourage more industry professionals to practice it. Front-end planning resolves the issues of selection of project team, inadequate scope definition, risk mitigation and obscure roles and responsibilities. The PDRI as outlined in this article can provide a mechanism to help with this process. The STUDY ALSO SHOWS THE WAY to which project stakeholders understand the application of the aforementioned issues related to project planning and scheduling in construction projects BY FONT –END planning at the end, the only purpose of FEP is to define project scope and thus ensure the environment for project success. Thus, it is observed that front-end planning maximizes the probability of project success and can be preferred over the traditional approach of construction project planning.

REFERENCES

[1] G. Gibson and M. Hamilton, “Analysis of Pre-Project Planning Effort and Success variables for Capital Facility Projects,” Research Report to CII, 1994, Doc.105.
[2] G. Gibson and P. Dumont, “Project Definition Rating Index (PDRI),”Research Report to CII, 1996, Doc.113-11.
[3] Y. Wang and G. Gibson, “A Study of Preproject Planning and Project Success using ANN and Regression Models,” ISARC 2008.
[4] O. Motta and O. Quelhas, “Megaprojects Front-End Planning: The case of Brazilian Organizations of Engineering and Construction,” AJIBM, vol.4, Aug. 2014, pp. 401-412.
[5] O. Faniran, P. Love and J. Smith, “Effective Front-End Project Management- A Key Element in achieving project success in developing countries,”.
[6] R. George, L. Bell and W. Back, “Critical Activities in the Front-End Planning Process,” JME, ASCE April. 2008, doi: 10.1061/(ASCE)0742-597X(2008)24:2(66)
[7] D. Arditi “Construction Productivity improvement ,” JCD ASCE, vol. 111, 1985, pp. 1-4.
[8] O. Faniran, J. Oluwoye and D. Lenard, “Effective Construction Planning,” Construction Management and Economics, vol.12, pp. 485-499.
[9] Construction Industry Institute (CII), “Pre-Project Planning: Beginning a Project the Right Way,” 1994, Research Summary 39-1.
[10] Construction Industry Institute (CII), “Pre-Project Planning Tools: PDRI and Alignment,” 1997, Research Summary 113-1.